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## Abstract

Consumption tax rates targeted at specific sectors are often reformed without empirical knowledge about the efficiency of these policies. This paper sheds light on the efficiency issue, the potential for welfare improving reform, by studying the incidence of value added taxes (VAT) on prices and quantities of barber services traded. I also study the incidence on the profits made by the targeted firms. I utilize a VAT reform targeted at a specific service sector which creates a natural experiment set up. VAT for hairdressing services in Finland was reduced from 22% to 8%, whereas the normal tax treatment still applied to beauty salons and other labor intensive services. The choice of the treatment and control groups was exogenous to circumstances in Finland, since these groups were selected in a more wider European setting. The results suggest that hairdressers cut their prices only by half of what complete pass-through would have implied, and that there was hardly any adjustment in the equilibrium quantity due to the reform. Instead of lowering prices, most hairdressers were able to increase their profits. There is important heterogeneity in the results according to firm size.

Key words: VAT reform, efficiency, tax incidence

## Tiivistelmä

Kohdennettuja kulutusveroja muutellaan usein ilman empiiristä tietoa kulutusveron hyvinvointivaikutuksista. Tässä tutkimuksessa selvitellään kulutusverotuksen tehokkuutta tutkimalla miten arvonlisäverot näkyvät kuluttajahinnoissa ja miten nämä verot vaikuttavat kulutettujen hyödykkeiden määrään. Tutkimuksessa katsotaan myös miten arvonlisäverot näkyvät yritysten tekemissä voitoissa. Suuri arvonlisäverouudistus vuoden 2007 alusta mahdollistaa arvonlisäveron vaikutusarvioinnit. Uudistuksessa parturi-kampaamoiden arvonlisäveroaste laski 22 prosentista 8 prosenttiin, kun samanaikaisesti muiden läheisten toimialojen arvonlisäverotuksessa ei tapahtunut muutoksia. Uudistuksen kohderyhmäksi valittiin juuri parturi-kampaamot, koska EU-direktiivi mahdollisti

alennuksen näille ryhmille, mutta ei tutkimuksessa käytetylle kontrolliryhmälle. Siten ryhmien valinta ei riippunut suoraan heidän taloudellisesta tilanteestaan. Tulosten perusteella parturi-kampaamoiden hinnat laskivat noin puolella siitä, mitä täysi arvonlisäveron siirtyminen hintaan implikoisi. Parturi-kampaamo-palveluiden kysyntä ei näytä veromuutoksen johdosta muuttuneen. Sen sijaan parturi-kampaamot kykenivät lisäämään voittojaan kevyemmän kulutus-verotuksen ansiosta. Tuloksissa on merkittävää eroa yritystyypin mukaan.

Asiasanat: alv-uudistus, tehokkuus, veron kohtaanto hintoihin

# 1 Introduction

Economic literature provides sound theoretical insights for an efficient consumption tax system (Crawford et al. 2010). Often efficiency depends on the extent to which the tax rate affects the quantity of goods traded in equilibrium. If a good has a relatively small quantity elasticity with respect to consumption taxes, the optimal result is to set the tax rate relatively high. The reasoning is that with relatively little effect on quantity the tax rate distorts the economy only slightly (Ramsey 1927, Diamond and Mirrlees 1971 and Weyl and Fabinger 2013), or does not affect the labor supply of consumers through correlation between consumption and the labor supply (Atkinson and Stiglitz 1976). However, the literature offers little convincing empirical insights about how responsive the equilibrium quantities in different sectors are to consumption taxes. The reason for the lack of empirical evidence is the scarcity of settings that enable causal estimates and the lack of micro data on relevant variables, like the quantity of goods traded.

This paper studies empirically the incidence of consumption taxation on prices, quantities and profits. One setting that allows me to estimate the causal price elasticity of quantity is a VAT reform affecting hairdressing services in Finland. The reform reduced the VAT rates on hairdressing services from 22% to 8%. There are natural control groups for which the VAT rate did not change: beauty salons, day spas and massage services. In legislation the line between some of these services is drawn at the eyebrows: hairdressing services apply to head hair and beards and beauty salon services to the eyebrows. Thus the services in the treatment and control groups resemble each other, since both are services for the beauty and well being of customers. Also, the firms in both groups are small labor intensive businesses in the same country. Thus the demand for these services and the economic conditions they face are similar. Moreover, the choice of the treatment group is exogenous to the behavior of firms, since the treatment group was chosen in an European Commission Directive long before the experiment was implemented in Finland.

I observe prices before and after the VAT change for a sample of firms.

Following the prices of individual services over the VAT cut enables me to estimate precisely the consumption tax incidence. Moreover, the price information is linked to firm level tax register data containing every firm liable to taxation in Finland. The tax register data contain the quarterly turnover and wage sums, and annual tax records containing income from the firm (profits). The turnover of these small firms is the quantity of services sold multiplied by their price. Observing the prices and turnover of the same firm before and after the VAT reform allows me to estimate the extent to which the equilibrium quantity changed as a response to the VAT cut. Observing profits allows me to estimate which side of the market got the surplus from the tax cut. Other tax record variables are useful for controlling the economic circumstances firms face.

The results for prices indicate that hairdressers cut their prices by 6%, half of what full pass-through implies. Larger firms reduced their prices more often than smaller firms. There is an indication that the degree of competition played a role, since there was more pass through on the prices of regular services advertized on street billboards than on the prices of more specialized and less visible products.

The results for the tax variables indicate a decline in the turnover of larger firms, but none for the smaller firms. This is in line with the price results for larger and smaller firms, the former reducing their prices more than the latter. Turnover is the consumer price times the number of services sold. Thus the price and turnover results together suggest that only the price responded, and that mostly in larger firms, but the quantity part of the turnover did not change in either group. An instrumental variables (IV) estimate tests this hypothesis more formally. In the IV estimation the reform is an instrument for changes in prices in the first stage. Instrumented price changes explain the changes in the value of output in the second stage. The result is that turnover changes by the same amount as prices, which again suggests that the equilibrium quantity of services did not change.

The results for other outcomes nicely complete the analysis of the VAT reform. The reform seems not to affect the wage sums of the treated firms. This indicates that the firms did not hire more, or increase the wages of their

existing employees. Instead, the reform increased the income, i.e. the profit, of entrepreneurs in the treated firms. Smaller firms increased their profits more than larger firms. This is again consistent with the heterogeneous price response and non responsive equilibrium quantity. Those firms that reduced their prices got less of the surplus from lower taxes than those that did not lower their prices. The mechanism behind this result is that when the tax inclusive price charged from customers does not increase by the implied full pass through, the tax exclusive price the entrepreneur obtains is reduced.

This study contributes to the literature studying the impact and optimality of consumption taxes in two ways. Firstly, credible estimation of the effect of consumption taxes on equilibrium quantity is challenging. This paper provides first quasi-experimental evidence on this. For policy implications this is very important since knowing the effect on quantities allows this study to shed new light on efficiency issues. The results here imply that the reduced VAT rate did not affect the equilibrium quantity. This result in turn could be explained by inelastic demand for the targeted services. In the Ramsey (1927) consumption tax theory, inelastic demand makes increasing the consumption tax rate, rather than decreasing it, more attractive. Moreover, the analysis discusses the idea that inelastic demand for goods or services in general affects the desirability of reduced VAT rates for these goods. In literature there are complementarity with labor supply (Saez 2002) and equity arguments (Diamond and Mirrlees 1971) for reduced VAT rates, which, this paper argues, do not empirically apply to hairdressing services.[1]

Secondly, this paper contributes to the literature by showing that consumption taxes do not always fully shift to prices. The focus in this paper is on service sector firms. There are not many studies focusing on this sector. Instead, Doyle and Samphantharak (2008) and Marion and Muehlegger (2011) study gasoline tax incidence on prices. The overall finding seems to be that these prices have a unit tax elasticity, although the pass-through depends on economic conditions. It seems natural that tax incidence could

[1]There is no strong case for the complementarity of hairdressing services with labor supply. Individuals do not spend large shares of their consumption budgets to hairdressing services. Furthermore, hairdressing services are to some extent luxury goods, making the equity reasons for lowering the VAT less compelling.

vary by sector. Carbonnier (2007) confirms this by comparing two French sectors, where VAT rate changed. He finds that the repair service sector VAT has lower pass-through to prices than the car sales sector VAT, and neither show full pass through. This result is much in line with the current study. Other studies (Poterba 1996, Besley and Rosen 1999 and Alm, Sennoga and Skidmore 2009) focus on sales tax incidence on various products utilizing price indices and find generally full or over pass through to prices.

Section 2 describes the institutional background and discusses the anticipated effect of lowering VAT. Section 3 presents the approach used to analyze the effects of the reform. The data are described in section 4. Section 5 presents and explains the results and section 6 concludes the study.

# 2 Design of the reform and anticipated effects

## 2.1 Institutional background and the reform

The European Union requires Member States to have a consumption tax system based on value added taxes (VAT). A certain degree of harmonization is required of individual Member States in setting their VAT rates (EC 2006a). As an exception to their normal VAT rates, Member States are allowed to experiment with reduced VAT rates for certain labor-intensive services. The aim of the EU rules is to allow Member States to experiment whether reduced VAT rates can increase employment and reduce the shadow economy in these services (EC 1999 and 2006b).

Finland reduced VAT on hairdressing services from 22% to 8% from the beginning of 2007. The reduced rate was to remain in force until the end of 2010 (Finlex 2006). It was subsequently decided to abolish it at the end of 2011. The original EU directive (EC 1999) listed the services that are eligible for reduced VAT rates. This list includes some labor-intensive services, but leaves out others (such as beauty salons). There is a fine line in legislation between a hairdressing and a beauty salon service. Performing a service for hair is in the former category, but performing a service on an eyebrow is in the latter category.

The aim of both the EU directive and the Finnish government was to increase economic activity within the targeted services. Thus the main argument for using reduced VAT rates was to boost employment in these service sectors. This argument relies on there being an elastic equilibrium quantity in these services. Reducing the VAT rate would then lead to a higher quantity, to more services being sold. Since the services are labor intensive, it was thought that increased output would lead to increased use of the main input, labor.

Firms report to the Finnish tax authorities the VAT that they collect on their everyday transactions. At the time of the reform, firms had to report VAT to the tax authority once a month. They reported the monthly sum of taxes separately by tax rate. Thus in 2006 hairdressers reported the amount of taxes remitted at the 22% rate and in 2007 they reported taxes remitted at the 8% rate on the same services sold. The same firm might also have had other sales, such as selling out products, which continued to be at the standard 22% rate. Thus the tax record of each firm shows the total amount of taxes charged on sales at each VAT rate.

## 2.2 Predictions from economic theory

The competitive economy model provides the basic insights about the effect of consumption taxes on prices and quantities. There the degree of shifting depends on the elasticities of demand and supply. The more inelastic side of the market bears the burden of taxation. If e.g. the supply is highly elastic, as under the constant returns to scale assumption, the consumption tax should pass through to the consumer price completely. Similarly, if demand is inelastic, the tax shifts to the consumer price and the quantity traded changes little. Higher tax leads to higher prices for consumers. On the other hand, if demand is elastic, the equilibrium quantity reacts to tax changes.

In normal analysis the length of the investigation horizon matters. In the short term supply could be more inelastic than in the long term. The argument is that firms cannot react immediately, since there are frictions preventing the amount of services they can supply. In this case reducing

the consumption tax rate reduces consumer prices a little. This in turn increases the profit margins of firms through higher producer prices. On the other hand, such frictions no longer play such a large role in the longer term. Then existing firms could expand their production and higher profits might attract more entry to the market. Supply becomes more elastic and thus prices come down more in the long than in the short run. Profits tend to zero. The testable prediction from this theory is a higher entry rate following consumption tax reductions.

It is conceivable that the industries in question are not fully competitive. For instance, customers may want to visit the same hairdresser from habit or in order to hear the latest rumors. It could also be that different hairdressers provide services of different quality, but this is difficult to know beforehand. Also, it is costly to search in these markets. Depending on the assumptions the model for imperfect competition could take different forms. Imperfect information and search costs could lead to monopolistic competition. Once a customer finds a satisfying match, she is not likely to easily try another hairdresser, even if the current hairdressers increases her prices.

If the competition is monopolistic or oligopoly, the effect of VAT on prices and quantities differs from perfect competition (Anderson et al. 2001, Myles 1989 and Weyl and Fabinger 2013). The effect depends on the elasticities of supply and demand, but also on the curvature of demand. This is because in imperfectly competitive markets firms take into account the extent to which demand changes in their pricing decisions. If demand is convex, there is greater pass-through on prices than in the full competition model. On the other hand, if demand is concave, the pass through will be less than in full competition model. Thus, depending on the curvature of demand, the model yields more or less pass through on prices than the full competition model. A reduction in the VAT rate should increase the profits of imperfectly competitive firms (Delipalla and Keen 1992), unless demand is very convex.

## 2.3 Pass-through in formulas

In the VAT reform for labor-intensive services, the VAT rate was reduced from 22% to 8%. The consumer price $p$ comprises the producer price plus the VAT. The proportional change in consumer prices ($\triangle$) after the reform is the amount by which the post reform price ($p^a$) changed from pre reform price ($p^b$) relative to the pre reform price:

$$\Delta = \frac{p^a - p^b}{p^b} * 100 = x\%$$

With full pass through to the consumer price $p$, the underlying producer price $\phi$ does not change, only the VAT added to the producer price changes. In this case the effect of the VAT reform on $\triangle$, using constant producer price $\phi$, is:

$$\phi * 1.22 = p^b, \qquad \phi * 1.08 = p^a$$

$$\triangle = \frac{\phi(1.08 - 1.22)}{\phi 1.22} * 100 = -11.5\%$$

Turnover ($Y$) evaluated at the consumer price is the quantity of sales ($Q$) multiplied by the consumer price ($p$): $Y = Q * p$. Assuming no change in demand and no change in consumer price, turnover would remain the same. If nothing happens to demand, but prices decline, consumer price turnover naturally declines as well. Regressing turnover against the reform indicator reveals the effect the reform has on this joint variable. However, one cannot separate between quantity and price effects from simply analyzing the value of outputs.

To evaluate what happens to quantity, it would be ideal to know both the quantity and price. The second best solution is to estimate the change in quantity from changes in turnover and prices. The idea is to use the definition of turnover, price times the quantity, to estimate what happens to the underlying quantity. The price and quantity changes are separated according to the following formula:

$$\frac{dln(p * Q(p))}{dln(p)} = \frac{dln(p)}{dln(p)} + \frac{dln(Q(p))}{dln(p)} = 1 + \eta \tag{1}$$

where $\eta$ is the price elasticity of demand.

With equation (1) it is possible to estimate the demand elasticity from changes in the value of output using an exogenous change in prices. For example, if the demand is inelastic, estimating the above equation produces a result that is close to one, since $\eta$ is close to zero. In the empirical data there is the complication that the same firm produces many services, the prices of which may change differently from each other.

# 3 Econometric method

This study utilizes a natural experimental approach. The VAT reform is considered a naturally occurring shock from the point of view of the firms. I compare their development with a comparison group that closely resembles them. The VAT reform was targeted at hairdressers in Finland from the beginning of 2007. The control group consists of beauty salons, day spas and massage services.

I use a regression difference-in-differences (DD) method to estimate the effect of the reform. I estimate the following equation for firm $i$ and time $t$:

$$Y_{it} = \alpha + \beta_1 1(haird)_i + \beta_2 1(after)_t + \beta_3 1(haird_i * after_t) + \beta_4 X_{it} + \varepsilon_{it} \quad (2)$$

where $1(haird)_i$ takes the value of one for hairdressers and zero otherwise, $1(after)_t$ takes the value of one for 2007 onwards and zero otherwise and $1(haird_i * after_t)$ is their interaction term. The variable $1(haird)_i$ has the subscript $i$ indicating that most specifications have a fixed effect for each firm. The coefficient of the interaction term, $\beta_3$, is the estimated average effect of the reform on the outcome $Y_{it}$. The outcome is the logarithm of either price, turnover or the wage sum, depending on the specification. $X$ is a vector of controls including flexible time trends in some specifications as well as firm level control variables describing the location and the economic behavior of a firm.

The DD approach identifies $\beta_3$, the effect of the reform on the outcome of

the treatment group, conditional on certain assumptions. The main assumption is the parallel trends assumption. Parallel time trends in the treatment and control groups indicates that the control group represents the counterfactual for the treatment group in the absence of the reform. For institutional reasons it is likely that the firms in the two groups resemble each other. Both groups consist of small labor intensive services, which are for the beauty and well being of their clients.

Empirically, an indication that this assumption is fulfilled is that the pre treatment time trends between the two groups are parallel. Figure 1 compares price indices in the treatment and control groups. The figure shows that both groups seem to display parallel time trends before the reform and after the treatment group has had time to respond to the reform. Moreover, figures 2 and 3 presents the consumer price turnover over time in the treatment and control groups. Firms are divided according to their size into figure for larger and figure for smaller firms. Turnover in the treatment and control groups also seem to follow each other over time. Thus it seems that the two groups can be compared to derive causal inference on the effectiveness of the reform.

Another important assumption is that the reform does not affect the control group. This assumption might not hold if the reform induces more demand for hairdressing services and consequently customers do not visit beauty salons as often as they used to. This does not seem likely, since although the two services are similar, they are different services. Hairdressing is for hair and beauty salon services for eyebrows or nails, for example. Thus even though the two groups are providing similar services, they do not provide the same services, which reduces the direct competition between the two groups. If there is a large effect on demand for hairdressing services, demand for beauty salon services could fall through the income effect. Empirically, figures 1, 2 and 3 do not indicate any clear effect for the control group at the time of the reform.

Over time there could be more entry into the hairdressing industry. For identification, entry poses a long term concern that does not directly invalidate the short term estimate. However, potential entry effects make the long and short term inferences different. To check for these effects, I compare the

entry rates in the treatment and control groups before and after the reform. The data stretch for three years after the reform. Long term typically refers to longer periods than that, but some changes in extensive margin trends should be visible on a three year time horizon, if entry is important in the long run.

In the second part of the analysis I am interested in how changes in prices can explain changes in turnover. The aim is to understand how price affects demand for the services. Mathematically, this relationship is shown in equation (1). Since the decision to reduce or not to reduce prices is made by the firm, a simple regression between these two variables would not reveal the causal effect that price has on turnover. Even more fundamentally, turnover is defined as price multiplied by quantity, and quantity is a function of price. Thus by definition changes in prices affect turnover. To distinguish the change in prices induced by the reform from other changes, I use an instrumental variable (IV) strategy.

The IV procedure is first to estimate the effect of the reform on prices and second to explain the change in turnover using the variation from the first stage. In equations the estimation is:

$$p_{it} = X'\pi_{10} + \pi_{11} Z_{it} + \xi_{1it}$$

$$Y_{it} = X'\pi_{20} + \pi_{21} Z_{it} + \xi_{2it}$$

where $X$ is a vector of covariates, $Z$ is the instrument variable and $\xi_1$ and $\xi_2$ are the error terms. The instrumented effect of price on turnover is given by:

$$\rho = \frac{\pi_{21}}{\pi_{11}}$$

where $\rho$ is the reduced form coefficient (the effect of the VAT cut on turnover) divided by the first stage coefficient (the effect of the VAT cut on prices). This measures a similar effect as equation (1), but uses only the variation induced by the VAT reform.

The identification requirements for the IV procedure are largely the same than for the DD approach, since I use the reform as an instrument. In both approaches the reform needs to be exogenous to turnover and price changes. Additionally, the instrument needs to be strong enough, and needs to have enough predictive power towards price changes. The strength of the instrument is an empirical question and is tested with the data. I present the first stage coefficients and an F-test value together with the IV results.

# 4 Data and description

This study utilizes information from tax registers and surveys. The register data come from the Finnish Tax Administration. The data include value added tax (VAT) and wage sum information originally at a monthly level for every firm liable to taxation in Finland. I aggregate the data to the quarterly level to reduce the large seasonal variance in the data. The data include reported VAT separately for each rate and also the VAT credited against inputs. Additionally, the data set includes information about firm accounts. They are on an annual level and include information about the profits, costs and assets of each firm. The data cover the years from 2002 to 2009, although I eliminate 2002 from most of the analysis due to a data quality problem.

The survey data contain the prices of services in the treatment and control groups for individual firms. There are two separate surveys. The first was conducted by Statistics Finland and consists of the data used to calculate the official consumer price index. It contains time series observations from 2002 to mid-2009 for hairdressers, beauty salons and massage parlors. The number of firms in these data is not very large. The second survey was collected by the Finnish Consumer Agency for hairdressing services. It contains only two time-observations, one before (October 2006) and one after (March 2007) the reform. It contains the prices of every service offered by about 400 hairdressers. Since the surveys are not conducted every month, the price data are at a quarter level in most of the analysis.

Table 1 gives the descriptive statistics for prices. The upper panel gives

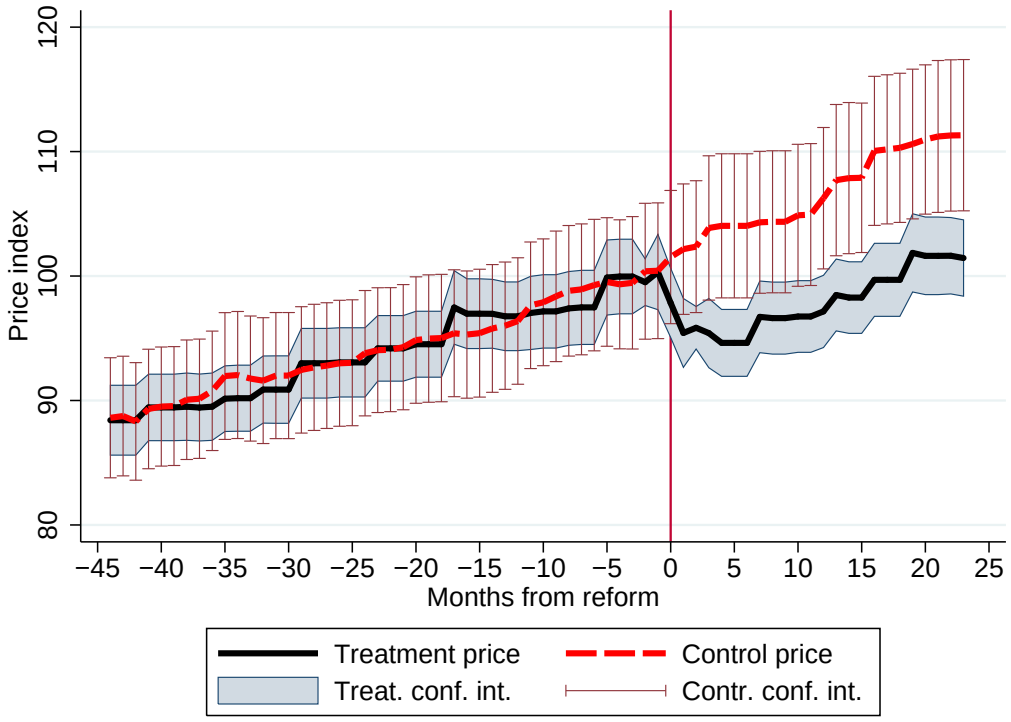
descriptive statistics for hairdressers in the treatment group and lower panel for beauty salons and massage parlors in the control group. The information is from pooled observations for the years 2002 to 2009 and the mean and standard deviations are in euros. The number of firms corresponds to the situation in the last quarter of 2006, just before the reform. The first price, the composite price, is the one that is used in the regression analysis. It contains haircutting and hairdressing prices for barbers and facial and massage prices for beauty salons and massage parlors. It is a firm level composite of the individual prices. The statistics for the treatment group are divided into samples coming from Statistics Finland and the Finnish Consumer Agency.

The descriptive statistics reveal that the prices are in the same range. In particular, haircutting prices and the massage prices the two samples are on average fairly similar. Facial services are more expensive. Thus the composite prices are on average higher in the control group than in the treatment group. This does not represent an obstacle for the DD approach, since similar trends over time are more important than level differences. Finally, the number of firms is not large in either group.

| | | Treatment | | | | | |
|---|---|---|---|---|---|---|---|
| | | Statistics Finland | | | Consumer Agency | | |
| | Comp. price | Haircut | Hairdress | Color | Haircut | Hairdress | Color |
| Mean | 27.67 | 23.50 | 31.55 | 55.92 | 23.95 | 31.04 | 38.32 |
| SD | 5.88 | 4.11 | 7.32 | 14.62 | 5.69 | 7.52 | 12.13 |
| N | 5356 | 3910 | 3916 | 3918 | 1305 | 1427 | 1381 |
| N Firms | 453 | 145 | 145 | 145 | 323 | 327 | 328 |
| | | Control | | | | | |
| | | Statistics Finland | | | | | |
| | Comp. price | Facial | Massage | | | | |
| Mean | 43.04 | 51.95 | 23.74 | | | | |
| SD | 17.56 | 11.35 | 8.46 | | | | |
| N | 4143 | 1332 | 1441 | | | | |
| N Firms | 97 | 48 | 53 | | | | |

Table 1: Descriptive statistics for prices in the quarterly data

Figure 1 shows the development of the composite price indices over time in the treatment and control groups. The index is normalized to 100 in the last quarter of 2006 in both groups. The vertical line shows the first month of reduced VAT, January 2007. The figure shows that hairdressing prices decline sharply at the time of the reform. The decline is about 5 to 7 index points, clearly less than the 11.5 point decline that full pass through to prices would be. There is no deviation in the control group prices from their overall trend at the time of the reform. Moreover, the prices in the two groups follow a similar trend before the reform. This indicates that the assumption about the control group representing the counterfactual works.




Note: The figure presents the development of prices over time for a sample of firms. The price index is composed of composite prices for hairdressing and other beauty services. The mean value of the index is normalized at 100 at the end of 2006. The vertical axis represents months from the reform in the beginning of 2007.

Figure 1: Treatment and control prices as an index over time

Table 2 presents descriptive statistics for the firm level tax information.

The data are pooled for the years 2003 to 2009. All the monetary variables are in euros. The table is divided into left and right panels according to treatment group status. The statistics shown are mean, median, standard deviation and number of observations. The table also shows the number of firms in each group in the last quarter before the reform.

The statistics indicate that the two groups resemble each other. In some cases the average value of the two groups is higher for the control group and in some cases for the treatment group. Moreover, turnover, net assets and rents have a larger median in the treatment group, although the mean is smaller. This indicates a highly heterogeneous sample and a small number of very large firms that increase the mean in the control group. The % partn. variables describes the share of firms whose legal form is a corporation or partnership. It is noticeable that the treatment group comprises less than 10% of these. The vast majority of hairdressers are sole proprietors. This is a bit less common in the control group. Coinciding with this, only 14% of firms in the treatment group have monthly turnover over 5000 euros on average, as the % large variable shows. There are more of these large firms in the control group (24%).

Figures 2 and 3 present the development of log consumer price turnover in semi annual data. The figures are divided by the size of the firm. Larger firms have an average monthly turnover of over 5000 euros, when pooling all the years in the sample, and less than that in smaller firms. The larger firms constitute about 15% of all hairdressers. The figures show that the larger firms have less time series volatility than the smaller firms. Both figures show the development of the average log turnover separately in both the treatment and control groups and the difference between them semi annually. The vertical line marks the reform.

The figures show that the larger barbers have a visible dip in their consumer price turnover at the time of the reform. There is no dip in the control group time series at the same time. Moreover, the two groups seem to follow each other fairly well over time. This indicates that there might be a treatment effect for larger firms, and that the two groups can be compared in the DD analysis. The smaller firm series are messier. The two groups still

| | Treatment | | | | Control | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Med. | SD | N | Mean | Med. | SD | N |
| Turnover | 4094 | 2692 | 26062 | 301842 | 5720 | 2165 | 15966 | 86296 |
| Input | 301 | 157 | 3681 | 299962 | 582 | 172 | 1851 | 85239 |
| Wage sum | 5526 | 2640 | 16155 | 19577 | 5606 | 3050 | 13885 | 10709 |
| Income | 14679 | 12214 | 16981 | 301842 | 12601 | 6285 | 22106 | 86296 |
| Net asset | 3736 | 1354 | 303837 | 301842 | 9557 | 416 | 110013 | 86296 |
| Other cost | 10475 | 7026 | 59484 | 284302 | 16578 | 8291 | 77707 | 77549 |
| Rents | 10339 | 2752 | 75777 | 235699 | 17232 | 2550 | 79720 | 60726 |
| % partn. | .095 | 0 | .29 | 300861 | .21 | 0 | .4 | 85235 |
| % large | .14 | 0 | .34 | 301320 | .24 | 0 | .43 | 85201 |
| N firms | | | | 10454 | | | | 3025 |

Note: The data are pooled for the years 2003 to 2009 and are quarterly. The monetary variables are in euros. % partn. describes the share of partnerships and corporations and % large the share of firms with an average monthly turnover over 5000 euros.

Table 2: Descriptive statistics for the firm level variables in the quarterly data

roughly follow each other over time. There does not seem to be any variation in the treatment group series at the time of the reform. Thus for the majority of hairdressers there does not seem to be any treatment effect on the value of their sales.

Figure A2 in the Appendix presents the development of log income for firms over time. The income statistics come from accounting data and are on an annual level. The figure is constructed similarly to the figure for turnover. The log income series shows a clear jump for the treatment group at the time of the reform. The control group seems to develop more steadily and shows no deviation from the overall trend at the time of the reform. The difference in these series each year shows clearly how income in the treatment group increases relative to the control group.

# 5 Results

This section presents the regression results. I utilize the natural experimental method by comparing Finnish hairdressers in the treatment group with

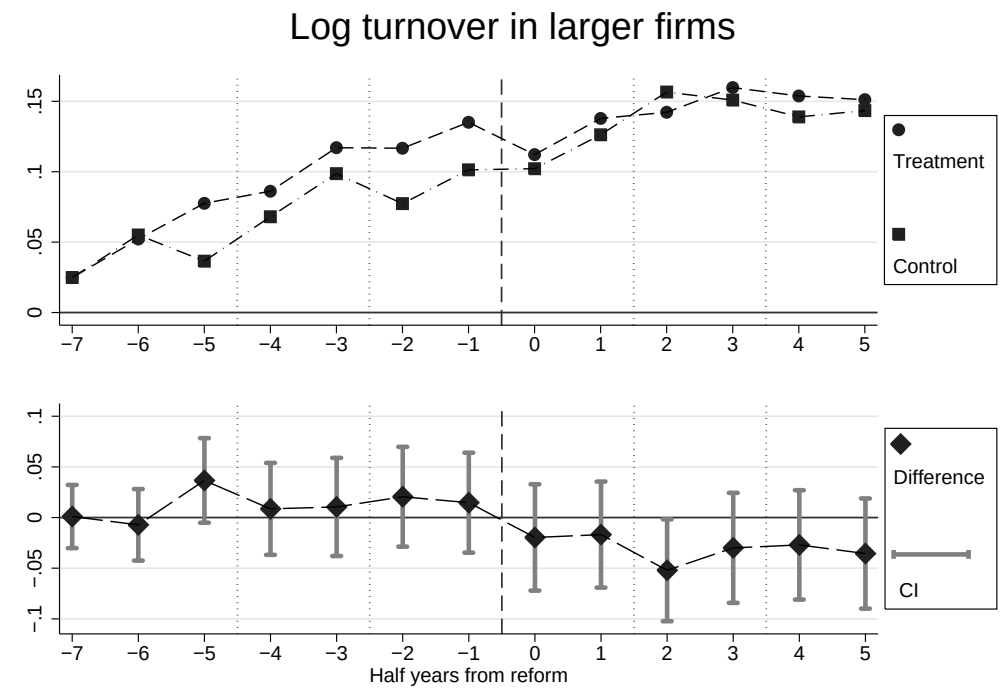



Figure 2: The development of log turnover in larger firms in the treatment and control groups

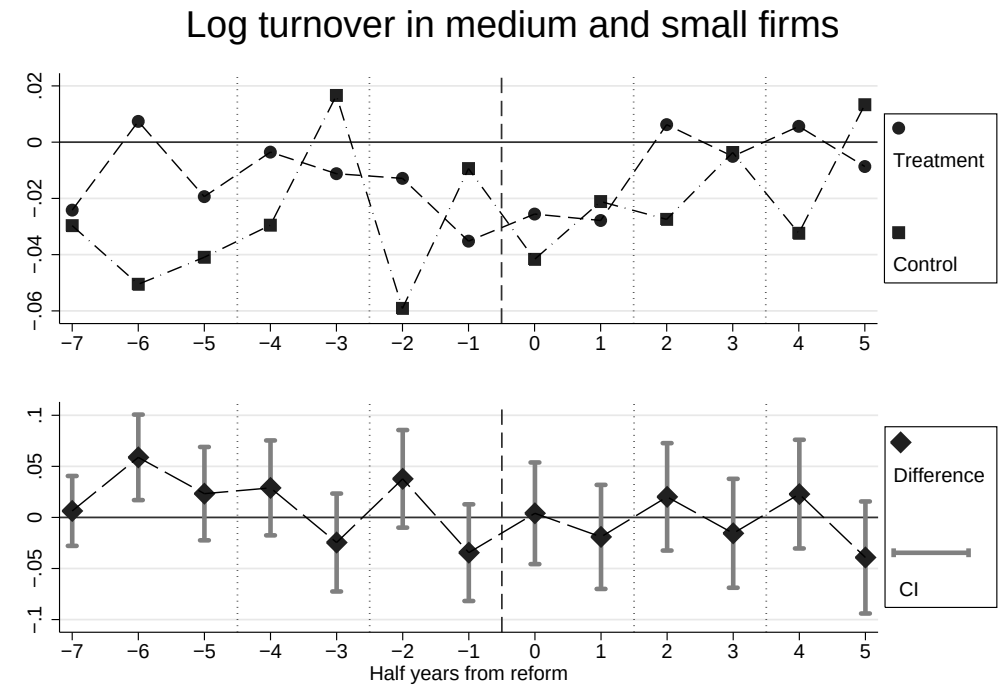



Figure 3: The development of log turnover in smaller firms in the treatment and control groups

beauty salons and other well being services in control group before and after the VAT reduction for hairdressing services from the beginning of 2007. The regression estimates are mostly differences-in-differences (DD) estimates followed by a few instrumental variables estimates. The coefficient of interest is a DD variable that takes the value of one for the treatment group after the reform and zero otherwise. I run this regression against different outcomes to get a full picture of what happened to the treatment group in the reform. The previous section presented graphs comparing the development of these outcomes over time in the two groups. These graphs confirm that the outcomes develop in a similar manner over time in the absence of the reform, and can thus be compared.

## 5.1 Tax incidence results

The first outcome of interest is prices. Table 3 presents the differences-in-differences (DD) estimates for log prices for the quarterly data. The dependent variable is the log of composite price.

The results are organized as follows: columns (1) through (3) present the actual DD estimates and column (4) a placebo estimate. Column (1) presents a simple regression including only the after and DD indicators. Column (2) adds to this time controls, a linear time trend for all and for the treatment group and an indicator for the quarter of the year. Column (3) adds to this firm specific controls, log input, net assets and income from the firm. Note that the number of firms drops in this estimate from column (2), since not all the price observations could be linked with firm account data. The placebo estimate in column (4) pretends that the reform took place from the beginning of 2004. The coefficient in the first row shows the DD estimate.

Since the outcome is in logarithmic form, the DD coefficient is the effect of the reform in log points (percentages). The DD result of -9.6% in column (1) is higher than the other DD estimates, since the prices increase over time, and the naive DD estimate does not take this into account. The preferred estimates in columns (2) and (3) indicate that prices declined by -5% to -6% as a response to the reform. This is roughly half of the theoretical full pass through of -11.5%. A Wald test indicates that this result is significantly different from full pass through. Other than the overall time trends, the estimates are not very sensitive to the additional controls. The placebo estimate produces zero, increasing confidence in the causal inference.

Table A1 in the Appendix presents the mean impact for different hairdressing prices. These are simple before and after comparisons without a control group. The results show that in particular perm prices fell by less than the normal haircut price (standard price). The difference may result from the different sample of firms offering these services and also from the different nature of the service.

Graph A3 provides similar point estimates in graphical form. The estimations are performed only on the price sample from the Finnish Consumer

| | (1) DD | (2) DD | (3) DD | (4) Placebo |
|---|---|---|---|---|
| DD | -0.096*** | -0.051*** | -0.06*** | -0.011 |
| | (0.01) | (0.009) | (0.013) | (0.012) |
| After | 0.123*** | -0.004 | 0.006 | 0.003 |
| | (0.009) | (0.008) | (0.012) | (0.011) |
| Log input | | | 0.008*** | 0.003 |
| | | | (0.003) | (0.003) |
| Net asset | | | 1.05e-07** | 5.45e-08 |
| | | | (4.44e-08) | (4.03e-08) |
| Income | | | -1.32e-08 | -2.96e-08 |
| | | | (1.89e-08) | (2.64e-08) |
| Time controls | No | Yes | Yes | Yes |
| N | 7913 | 7913 | 5423 | 2940 |
| $R^2$ | 0.258 | 0.455 | 0.420 | 0.440 |
| N firms | 603 | 603 | 501 | 474 |

Table 3: DD results on log prices

Fixed effects regression results on log prices. The explanatory variables in column (1) are an indicator for the after period and a DD indicator. Column (2) adds to this flexible time controls. Column (3) adds firm account variables. Column (4) is a placebo estimate where the after period starts from the beginning of 2004. The flexible time controls used are a linear time trend, a linear time trend for the treatment group and an indicator for the quarter of the year.

Agency. This sample allows to compare different services in the same firms. Thus the results reveal the differing pass through by type of service rather than by type of firm. The graph shows that the standard price, i.e. haircutting or a basic hairdressing service, declines less than the more specialized color price. The perm price is somewhere in between in this estimate. Moreover, graph A1 presents the distribution of proportional changes in standard and color prices before and after the reform. The distributions clearly show that there are smaller reductions and more cases of no reductions in the color price than in the standard price.

The standard price is something that is usually advertised in the street or on a website. The price for coloring services usually depends on the type of hair and the amount to be colored. Thus it usually is negotiated between the customer and hairdresser and is less visible. The difference in pass through in these different prices supports the hypothesis that at least some of the services are imperfectly competitive. Firms are able to utilize imperfect information about less visible and non standard services. It is more costly for customers to search for a perfect match in for such services because of the imperfect information about quality.

Another interesting feature about the prices is whether or not firms reduce their prices. Table 4 presents regression results for this. The dependent variable is now an indicator for whether or not the composite price is reduced by a certain amount at the time of the reform. The results are organized as follows: columns (1) through (3) present the general DD results for different amounts of price reductions. Column (4) investigates additionally the interaction with larger firms. Column (5) presents a simple before and after comparison for hairdressers interacted with their union status. Column (6) presents a placebo estimate.

Column (1) indicates that slightly over half of the hairdressers reduced their prices at least somewhat and column (2) that almost half reduced their prices by at least 5%. Column (3) indicates that roughly a fifth of hairdressers reduced their prices by at least 10%, close to full pass through. Thus there is heterogeneity among hairdressers in the amount by which they reduced their prices. Moreover, a substantial fraction of barbers did not reduce their prices

at all, even though their VAT rate fell from 22% to 8%.

There seems to be more heterogeneity in the size of the firm (measured by turnover) providing the services. One third of smaller firms reduced their prices at least somewhat, and half of the larger firms did so.[2] Moreover, firms belonging to their representative union reduced their prices by 5%, clearly more often than the rest of the firms.

The placebo estimate in this case produces a small coefficient, which is weakly significant. This could indicate that some hairdressers may reduce their prices in the normal state of the world at the turn of the year, or have sales campaigns then. However, this coefficient is only one tenth of the actual DD coefficient. Thus it does not create great concern for the estimation approach used here. Similar results can be obtained for other non reform years.

## 5.2 Results for turnover

The next interesting outcome is the value of services sold, i.e. turnover. This outcome summarizes how pricing effects show up in the value of sales and changes in the quantity of services. Table 5 shows the DD results for log turnover evaluated at consumer prices in the quarterly data. Columns (1) and (2) show the results for all firms without and with covariates. The firm specific controls in column (2) are taken from the cost side of the profit and loss calculation. The net assets of the firms are also used. The table presents only the coefficient of rents, since that is the only statistically significant variable in the regressions. Columns (3) and (4) present the results divided by firm size into small and large firms. Column (5) presents results for unionized hairdressers only compared to all control group firms.

The DD results in columns (1) and (2) for all firms in the sample show the significance of flexible time controls. The simple estimate without other covariates than indicators for after and the DD variables imply that there was a significant reduction in consumer price turnover. However, when an indicator for each quarter and a linear time trend for the treatment group

[2]Larger firms have at least 5000 euros turnover per month on average.

| | (1) $\triangle < -0.5\%$ Treat vs contr. | (2) $\triangle < -5\%$ Treat vs contr. | (3) $\triangle < -10\%$ Treat vs contr. | (4) $\triangle < -0.5\%$ Treat vs contr. | (5) $\triangle < -5\%$ Treat | (6) $\triangle < -0.5\%$ Placebo |
|---|---|---|---|---|---|---|
| DD | 0.54*** | 0.4*** | 0.23*** | 0.35*** | | 0.06* |
| | (0.04) | (0.04) | (0.03) | (0.06) | | (0.03) |
| DD*large | | | | 0.17** | | |
| | | | | (0.07) | | |
| After | -0.01 | -0.01 | -0.03* | 0.08* | 0.29*** | 0.03* |
| | (0.02) | (0.02) | (0.01) | (0.04) | (0.03) | (0.02) |
| Log input | | | | | -0.01 | |
| | | | | | (0.01) | |
| After*Union | | | | | 0.26*** | |
| | | | | | (0.06) | |
| N | 7584 | 7584 | 7584 | 5051 | 11539 | 3864 |
| $R^2$ | 0.552 | 0.405 | 0.235 | 0.569 | 0.377 | 0.092 |
| N firms | 555 | 555 | 555 | 452 | 447 | 254 |

Table 4: Results for the probability of reducing prices

Note: Fixed effects estimates on the probability of reducing prices. The dependent variable takes the value of one when the price is reduced in the first quarter of 2007 and zero otherwise. Columns (1) to (4) present the DD results for the probability of reducing prices by the percentage indicated by the second row. Column (4) additionally presents an interaction result for large firms, where the sample is divided by turnover size. Column (5) presents a before and after comparison for the treatment group only and adds an interaction for whether or not a firm belongs to a representative union. Column (6) presents a placebo estimate comparing the two groups before and after 2004. All the estimates are controlled for a linear time trend, a linear time trend for the treatment group and an indicator for quarters of the year. The robust standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

are added, the result disappears.

Figures 2 and 3 indicate that there might be some effect on larger firms, but not on smaller firms. Column (3) confirms that there is a roughly three percent reduction in the turnover for larger firms. At the same time there does not seem to be any significant effect for the majority of firms, the smaller firms. This result is consistent with the price results and the fact that the quantity of services did not change much as a response to the reform. The price results indicate that larger firms reduced their prices more often. Although on average the price reduction was more than 3%, this is consistent with the turnover result, since not all the turnover of these firms comes from hairdressing services. The turnover captures the value of all sales. For instance, if the value of half of all services declines by 6%, the total value of output declines by 3% without any change in the quantity of services.

Finally it is interesting that unionized firms reduced their consumer price turnover more than others. This again coincides with them reducing their prices more often. All these results indicate that there was heterogeneity in the price response and the changes in the value of output reflect that. There are no indications that the reduced prices resulted in more services being sold.

Table A2 in the Appendix presents the placebo results for consumer price turnover. The estimates pretend the reform took place from the beginning of 2005. All the different specifications yield no effects, giving more confidence in the actual DD estimates. However, placing a mock reform at the beginning of 2004 produces small positive (statistically significant) effects. This is not worrying for the main estimates, since the effect is opposite from the main estimate and data are missing for control group firms in the earlier years in the turnover data.

The reduced form DD result for turnover suggests that there is not much changes in the quantity of services. I attempt to test this more rigorously by regressing log prices against log turnover. As equation (1) indicates, this produces one plus the effect prices have on quantity, interpreted as demand effect. The problem with straightforward estimation is that there could be endogeneous reasons for price changes. To overcome that problem, I instru-

| | All | | Divided | | Union |
|---|---|---|---|---|---|
| | Simple | Controls | Large | Small | |
| | (1) | (2) | (3) | (4) | (5) |
| DD | -0.056*** | 0.016 | -0.033** | 0.024 | -0.079** |
| | (0.012) | (0.011) | (0.015) | (0.015) | (0.031) |
| After | 0.129*** | 0.078*** | 0.174*** | -0.007 | -0.064** |
| | (0.011) | (0.016) | (0.029) | (0.020) | (0.030) |
| Rents | | 0.335*** | 0.429*** | 0.322*** | 0.564*** |
| | | (0.008) | (0.031) | (0.009) | (0.041) |
| Time controls | No | Yes | Yes | Yes | Yes |
| N | 371,081 | 350,051 | 56,272 | 293,779 | 20,406 |
| $R^2$ | 0.009 | 0.119 | 0.247 | 0.106 | 0.187 |
| N of firms | 20,954 | 19,734 | 2,593 | 17,141 | 1,043 |

Note: Fixed effects regressions on the log of consumer price turnover in the quarterly data. The DD indicator takes the value of one for hairdressers after the reform (2007 onwards) and zero otherwise. The time-control variables are an indicator for each quarter and a linear time trend for the treatment group. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 5: DD results for turnover evaluated at consumer prices

ment the changes in prices with the DD indicator. This instrument depends on the reform and its exogeneity is confirmed by the previous DD analysis.

Table 6 collects the IV estimation results. Column (1) presents a simple IV estimate that does not control for firm specific factors or overall time trends. Column (2) adds firm specific controls and a linear time trend. Column (3) adds a specific linear time trend for the treatment group and an indicator for the quarter of the year. The first row presents the effect the log price has on log turnover. The table also presents the first stage coefficient and an F-test value in the bottom row.

The simple estimation in column (1) is close to zero. However, adding simple controls in column (2) changes the coefficient dramatically to over one. The preferred estimate in column (3) is very close to one. However, the small number of observations makes these estimation results highly inaccurate and all sorts of implied demand estimates could be included in the confidence intervals. The instrument seems to be strong, as indicated by the significant first stage and the F-test values. The inaccuracy comes from volatile turnover

| | (1) | (2) | (3) |
|---|---|---|---|
| Log price | 0.27 | 1.26* | 0.97 |
| | (0.56) | (0.72) | (0.66) |
| After | 0.066*** | 0.06 | 0.053* |
| | (0.022) | (0.039) | (0.031) |
| Log input | | 0.28*** | 0.27*** |
| | | (0.03) | (0.03) |
| First stage | -0.109*** | -0.069*** | -0.070*** |
| | (-10.66) | (-5.45) | (-5.46) |
| N | 5683 | 4611 | 4611 |
| N of firms | 516 | 469 | 469 |
| F value | 113.57 | 29.71 | 29.8 |

Table 6: IV results for consumer price turnover

Note: Fixed effects instrumental variable regressions on log consumer price turnover. The instrumented variable is log price and the instrument is the DD indicator. Column (1) has no other controls than those shown, column (2) adds to this a linear time trend and firm controls, net assets, log inputs, income from the firm and all costs. Column (3) adds a linear time trend for the treatment group. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

data in the second stage. The coefficient for price supports the view that price changes alone drive the changes in output value, and not changes in demand for the services. This result should be interpreted with caution because of the inaccuracy, however.

## 5.3 Results for other variables

To give a full picture of how the VAT reform affected the firms, this section presents the results for other outcomes.

The main motivation for the reform was to promote employment in the service sectors. Since most hairdressers are sole proprietors, the turnover statistics should capture the increase in their sales and thus the increased work for the entrepreneurs. Some hairdressers also have employees. Thus the next outcome of interest is what happens to them in the reform. The quarterly wage bill of each firm should summarize this effect.

Table 7 collects the DD results for the log wage bill. Column (1) presents

| | (1) | (2) | (3) |
|---|---|---|---|
| DD | -0.056* | 0.002 | -0.013 |
| | (0.032) | (0.030) | (0.029) |
| After | 0.230*** | 0.110*** | 0.055 |
| | (0.025) | (0.035) | (0.034) |
| Log rent | | | 0.289*** |
| | | | (0.038) |
| Time controls | No | Yes | Yes |
| N | 28,966 | 28,966 | 27,862 |
| $R^2$ | 0.044 | 0.069 | 0.106 |
| N of firms | 1,752 | 1,752 | 1,652 |

Table 7: DD results on log wage bill

Note: Fixed effects regressions on the log of wage bills in quarterly data. Column (1) presents a plain DD estimation and columns (2) and (3) add flexible time controls, an indicator for each quarter and a linear time trend for the treatment group. Column (3) adds the log of rent costs in the firm. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

a simple estimate, column (2) adds time controls and column (3) adds firm level covariates. The result in column (1) indicates a decline in the wage bill, but this result disappears when the controls are added to the estimations. The results in columns (2) and (3) indicate a fairly precise zero effect on wage bills. Thus it seems that the reform did not succeed in increasing paid employment in the hairdressing industry.

Thus far it seems that the reform reduced hairdressing prices somewhat, but did not have much effect otherwise. However, since the VAT rate was reduced quite significantly, the benefit should show up somewhere. To investigate the hypothesis that hairdressers increased their profits, table 8 presents the DD results for log income from the firm.

Columns (1) and (2) are for all firms in the estimation sample and columns (3) and (4) divide the sample into large and small firms. Column (5) presents the placebo estimate. Column (1) presents again a simple estimate and column (2) adds time controls and firm specific covariates. Adding the time controls seems to increase the point estimate for the effect of the reform in this case. The result in column (2) indicates a 14% increase in profits due

to the reform. This is a very significant increase. The zero result from the placebo estimate in column (5) again reinforces the causal interpretation of the large result in column (2).

The divided sample results in columns (3) and (4) indicate that profits increased proportionally more in smaller firms than in larger firms. This is an interesting finding and coincides with the price and turnover results. Smaller firms did not reduce their prices by very much. Thus they were left with a potentially higher profit margin for each service sold. Total profits would have declined if demand for the services had declined. However, the turnover results indicate that this did not happen. Thus total profits in these firms increased. Larger firms reduced their prices somewhat, and therefore the profit margin from their services did not increase by as much as in smaller firms. In fact, the result in column (3) is very weak and changing the controls makes it occasionally insignificant altogether. In summary, smaller firms got the extra welfare from the tax reform, but larger firms shifted part of that to consumers.

I also present the DD results for the other firm account variables in the annual data collected in table 9. Column (1) is for net assets, column (2) for the log of total costs, column (3) the log of wealth in the firm and column (4) the log of turnover in the annual data. Net assets are not in logarithmic form, since the variable could potentially take a negative value. None of these estimates provide anywhere near statistically significant results for the DD indicator. This indicates that the marginal costs of producing the services did not change as a response to the reform. Moreover, it seems that hairdressers were unwilling to use their extra income to increase the wealth of their firm. If anything, the net assets and wealth variables are negative.

The final outcome of interest is the effects on entry into the hairdressing industry. It seems that hairdressers gained from the reform by increasing their profits. A natural hypothesis follows that increased profits will attract more firms to enter into this industry, and also less firms to exit from it, since it is more profitable than before. Table 10 presents results testing this hypothesis. The estimations are DD estimations on a balanced panel. If a firm is observed in the data in any period, it is put in the data in all periods.

| | (1) All | (2) All | (3) Large | (4) Small | (5) Placebo |
|---|---|---|---|---|---|
| DD | 0.094*** | 0.143*** | 0.091* | 0.172*** | 0.033 |
| | (0.019) | (0.028) | (0.052) | (0.034) | (0.036) |
| Net assets | | 0.000** | 0.000** | 0.000 | 0.000 |
| | | (0.000) | (0.000) | (0.000) | (0.000) |
| Log other cost | | 0.330*** | 0.086*** | 0.360*** | |
| | | (0.012) | (0.031) | (0.013) | |
| Log rent | | 0.138*** | 0.184*** | 0.134*** | |
| | | (0.009) | (0.033) | (0.009) | |
| After | 0.197*** | | 0.221*** | 0.258*** | 0.246*** |
| | (0.018) | | (0.050) | (0.038) | (0.030) |
| N | 86,226 | 79,485 | 12,765 | 66,720 | 46,047 |
| $R^2$ | 0.050 | 0.151 | 0.093 | 0.167 | 0.010 |
| N of firms | 18,865 | 17,644 | 2,511 | 15,133 | 14,899 |

Table 8: DD results for log income from firm

Note: Fixed effect regressions on log income from firm in yearly data. The DD indicator takes the value of one for hairdressers after the reform (2007 onwards) and zero otherwise. In columns (2) to (5) time is controlled with an indicator for each year and a linear time trend for the treatment group. Column (2) adds an interaction with sole proprietors and year indicators. Columns (3) and (4) are divided into large and small firms, where large firms have monthly turnover greater than 5000 euros. Column (5) presents a placebo estimate that places a mock reform at the beginning of 2005. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

| | (1) Net assets | (2) Log all costs | (3) Log wealth | (4) Log turnover |
|---|---|---|---|---|
| DD | -6,233 | -0.017 | -0.018 | -0.016 |
| | (4,448) | (0.018) | (0.025) | (0.017) |
| After | 1,662 | 0.160*** | 0.019 | 0.181*** |
| | (3,929) | (0.024) | (0.029) | (0.023) |
| Net assets | | 0.000*** | | 0.000*** |
| | | (0.000) | | (0.000) |
| N | 99,497 | 93,200 | 84,401 | 97,321 |
| $R^2$ | 0.000 | 0.024 | 0.003 | 0.011 |
| N of firms | 21,103 | 19,817 | 18,252 | 20,670 |

Table 9: DD results on other outcomes

Note: Fixed effect regressions on other outcomes in yearly data. DD indicator takes the value of one for hairdressers after the reform (2007 onwards) and zero otherwise. Net assets are in euros and other outcomes in log form. All estimations are controlled with an indicator for each year and a linear time trend for treatment group. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

The outcome takes zero and one values. Value one in the entry regression is when a firm is first seen in the data. Value zero in the exit regression is when a firm is last seen in the data.

The table presents the results so that the first column for each outcome is a simple regression and the second column adds time controls. For both entry and exit the simple regression is statistically significant, but disappears with the time controls. All the coefficients are small, and the results can rule out even a one percentage increase in entry or exit due to the reform. The final observation period in the data is 2009, three years after the reform. This is not a very long time, but if anything is about to happen on a longer time horizon, we would expect also something to happen on a three year horizon. In addition, the reform was intended to be temporary. This may have discouraged entry in the hope of higher profits.

| | (1) Entry | (2) Entry | (3) Exit | (4) Exit |
|---|---|---|---|---|
| DD effect | -0.0084*** | -0.0024 | -0.0082*** | -0.0014 |
| | (0.001) | (0.002) | (0.001) | (0.001) |
| N | 648,340 | 648,340 | 648,340 | 648,340 |
| $R^2$ | 0.0004 | 0.0029 | 0.0017 | 0.0042 |
| N of firms | 23,155 | 23,155 | 23,155 | 23,155 |
| Flexible time controls | No | Yes | No | Yes |

Note: Fixed effects regressions on an indicator for entering in columns (1) and (2), and exiting in columns (3) and (4) in quarterly data. The main variable of interest is a DD indicator having the value of one for hairdressers after the reform and zero otherwise. The flexible time-control variables are an indicator for each quarter, a linear time trend for the treatment group and a quadratic time trend for the treatment group. Robust standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 10: DD results for entry and exit

# 6 Conclusion

This paper studied the effect of a reduced VAT rate on various outcomes for labor intensive services. To estimate the causal impact of the VAT rate on prices and demand for the services, the estimations utilized a large VAT reform for hairdressing services where the VAT rate was cut from 22% to 8%. EU legislation dictated that VAT could not be reduced for a very similar group of firms, beauty salons, masseurs and other wellbeing services.

The analysis concentrated on the efficiency of consumption taxation in these services. With regards to that, the first outcome of interest was prices. The standard competitive economy model implies that the pass through to prices is determined by the elasticities of demand and supply. The result in this paper shows that prices were reduced by 5% to 6%. This is about half of the full pass through of -11.5%. The standard competitive economy model would produce this result if demand and supply are somewhat elastic, but not fully inelastic or elastic.

The price results also revealed some heterogeneity in pass through. Larger firms, those belonging to a representative union and some specific services

had greater pass through than other groups. The results regarding the type of service indicate some market power. Also, union members may have wanted to show greater pass through for lobbying reasons. This is because VAT reduction looks good in the public eye if there is a large pass through to prices.

Many efficiency results relate to the responsiveness of equilibrium quantity to changes in the tax rates. The results indicated that turnover, the value of output, did not change much on average as a response to the reform. However, larger firms, which reduced their prices more often than smaller firms, experienced a decline in their output value. On the other hand, smaller firms, which did not reduce their prices much, did not experience any such decline in their output value. Since there are a lot of these smaller firms, this explains the small average effect on turnover. These results indicate that the number of services sold, the equilibrium quantity, was unresponsive to the reform. To further pursue this, I estimated the effect prices have on turnover. Changes in prices were instrumented with the reform indicator. These estimates provided support for the hypothesis that only prices changed as a response to the reform, not the quantity of services sold.

The turnover results indicated that the demand for hairdressing services is rather inelastic. Inelastic demand together with the less than perfect pass through is not consistent with the competitive economy model. In that model inelastic demand would imply full pass through to prices. However, since the pass through was only half of that, it seems that the competitive economy model does not capture all the essential features of the hairdressing service markets. Rather the results give support to an imperfectly competitive model.

Many hairdressers did not reduce their prices even though they faced a substantial reduction in the consumption taxes they remit to the government. Furthermore it seems that the number of services they sold did not change much. Employment in the sector did not change noticeably and there was not increased entry due to the reform. Thus government seems to have lost in tax revenues, but did not gain from higher employment in the sector. The natural question after these results is, where did the money go? The results

for profits, in the form of income from the firm, indicate that it was entrepreneurs who benefited from the tax reform. They seem to have increased their profits by almost 15%. Moreover, the profit response was heterogeneous across the treated firms. Larger firms did not increase their profits as much as smaller firms. This coincides with the price results, larger firms reducing their prices more often than smaller firms. Not lowering the consumer price after a reduction in consumption taxes translates into an increase in the producer price and therefore profit margins. Thus smaller firms took the whole surplus from the lower tax rate, and the larger firms divided the surplus with consumers.

The desirability to reduce consumption taxes depends on the responsiveness of the equilibrium quantity in different ways in different models. In the Ramsey (1927) consumption tax model an elastic equilibrium quantity causes consumption taxes to be distortive. Thus goods that are not responsive in equilibrium quantities should face higher taxes than other goods. The very inelastic demand for hairdressing services suggests that the VAT reduction was not efficient policy. The same intuition follows even if one allows for imperfectly competitive markets (Myles 1989 and Weyl and Fabinger 2013).

A similar reasoning was behind the original suggestion by the European Commission to reduce the consumption tax rate for labor intensive service sectors. The reasoning was that since the services are labor intensive, any increase in the equilibrium quantity increases employment in that sector. This reasoning relies on demand changing sufficiently as a response to tax reductions. Since the tax cut did not increase the number of services sold, these kinds of benefits were not attained. Instead, it seems that entrepreneurs were able to utilize their market power and increase their profits.

Another aim in the European Commission directive to reduce the VAT rate on these services was to reduce the shadow economy. The current study does not have access to data that could directly reveal the effect of the reform on the shadow economy. Despite that, the negligible response in visible turnover suggests that there were no large gains from the reform in terms of less shadow economy. On the contrary, a large increase in visible tax reports would have implied significantly less shadow economy activity as a response

to the reform.

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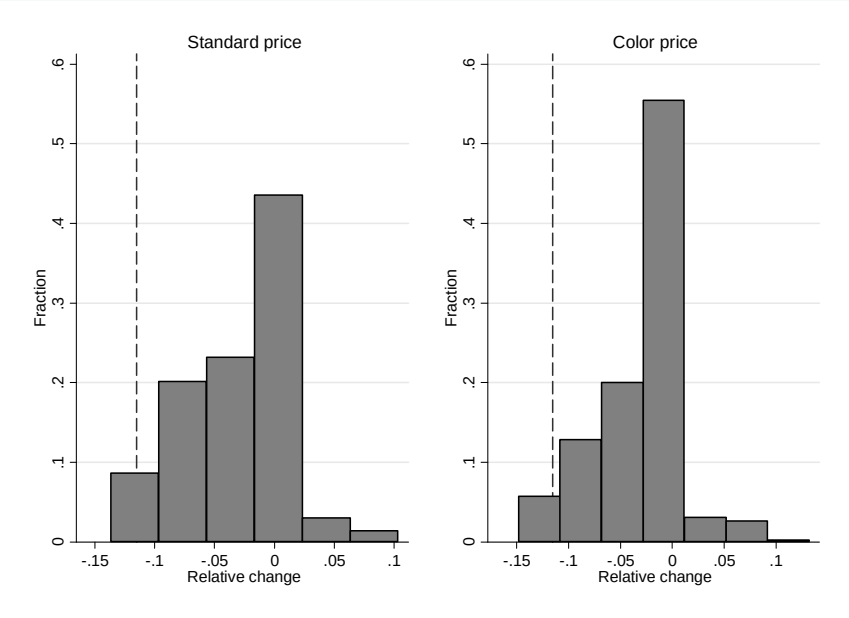
# A Appendix

All the tables and figures are in this appendix.




Note: The graph presents the distribution of proportional changes in prices before and after the reform. Standard price is normal hairdressing service and color price is more specialized service.

Figure A1: Relative change in prices

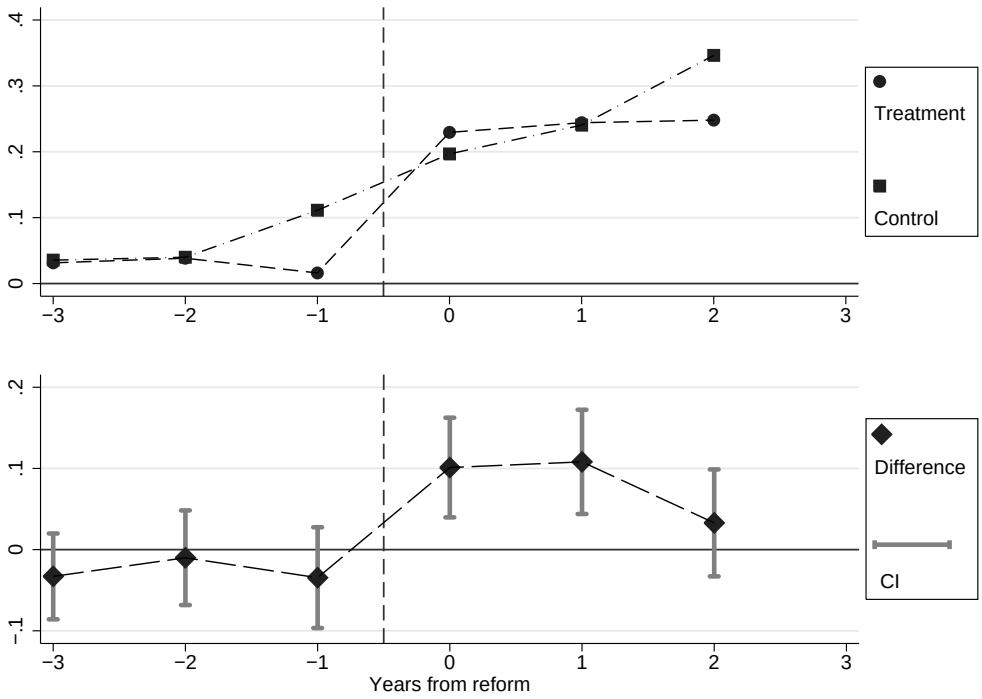



Figure A2: Log income over time in treatment and control groups

| | (1) Advertise | (2) Color | (3) Perm |
|---|---|---|---|
| After | -0.055*** | -0.045*** | -0.028*** |
| | (0.004) | (0.007) | (0.004) |
| Log input | 0.007** | 0.01 | -0.003 |
| | (0.003) | (0.008) | (0.003) |
| Net asset | 6.66e-08 | 1.22e-07*** | -2.63e-07** |
| | (5.12e-08) | (3.74e-08) | (1.20e-07) |
| N | 4581 | 4489 | 1168 |
| $R^2$ | 0.307 | 0.299 | 0.173 |
| N firms | 454 | 442 | 297 |

Table A1: Difference results for different barber prices

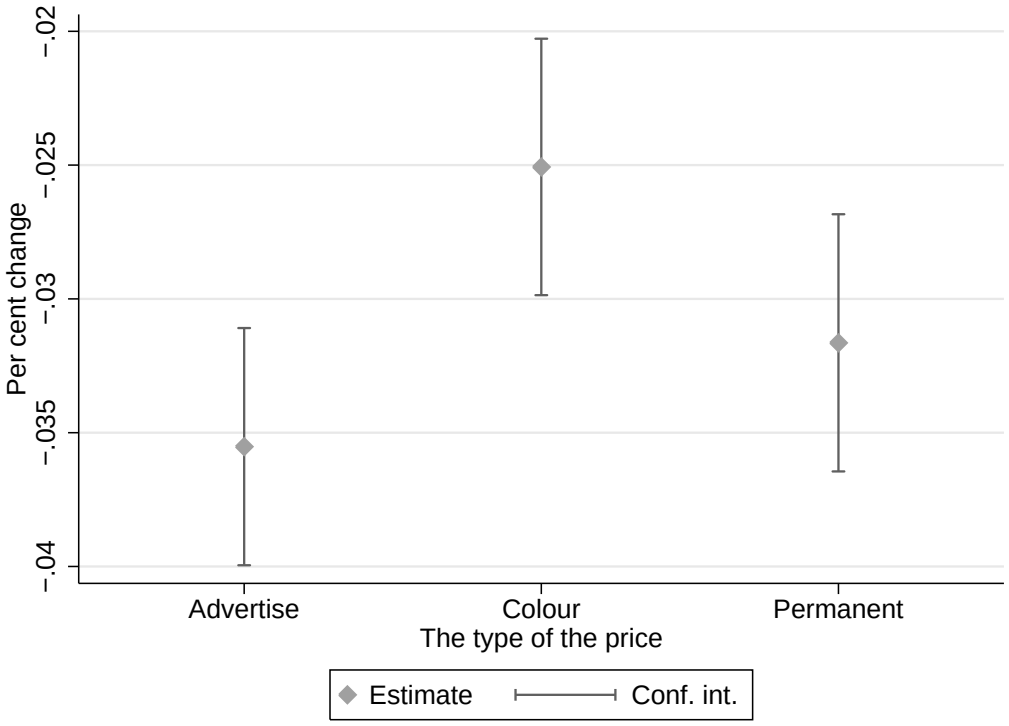



Figure A3: The price change by type of service

| | All | Large | Small | Lobby |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Placebo DD | 0.019 | 0.017 | 0.015 | 0.027 |
| | (0.013) | (0.015) | (0.018) | (0.030) |
| Placebo after | 0.045*** | 0.047** | 0.217*** | -0.044 |
| | (0.011) | (0.019) | (0.031) | (0.028) |
| Rents | 0.274*** | 0.238*** | 0.248*** | 0.505*** |
| | (0.009) | (0.033) | (0.012) | (0.051) |
| Time controls | Yes | Yes | Yes | Yes |
| N | 239,012 | 37,321 | 155,914 | 13,996 |
| $R^2$ | 0.088 | 0.256 | 0.111 | 0.138 |
| N of firms | 16,845 | 2,274 | 12,048 | 890 |

Note: Fixed effects regressions on the log of consumer price turnover in quarter level data. Placebo DD indicator takes value one for barbers after 2005 and zero otherwise. The flexible time-control variables are an indicator for each quarter and a linear time trend for treatment group. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table A2: Placebo DD results on consumer price turnover

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